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A REVISION OF THE GENUS CAMPTOPROSOPELLA HENDEL (DIPTERA, LAUXANIIDAE)

BY G. E. SHEWELL
Ottawa, Ont.

(Continued from the June issue)

16. **Camptoprosopella gracilis** n. sp.
(Figs. 11, 12.)

Yellow. Legs concolorous with body or else apices of all tarsi light brown. Wing veins yellow. Dimensions: Body 3—3.5 mms. Wing 3—3.25 mms.

Front and face in profile the same as *slossonae* n. sp. with similar variation. Third antennal segment about twice as long as wide (1/2.0—1/2.3), infuscation subequal on both sides, covering apical fifth to third above and third to two thirds below. Arista with hairs arranged as in *setipalpis* n. sp. Infuscation of vertex roughly diamond-shaped, more or less pointed in front, longer than wide, not more than twice as long as triangle. Cheeks between a fourth and a third eye height (1/3.7—1/3.4). Palpi narrow, infuscated on apical half or a little more with four to six long ventral hairs. Anterior dorsocentrals half length of second pair or a little less (1/2.4—1/2.0).

Superior forceps long and thin with parallel sides, nearly four times as long as wide, abruptly constricted distally to pointed tips. Processes of ventral plate resembling those of *setipalpis* n. sp. and *mallochi* n. sp. in general outline, but much longer and more robust. Phallus laterally compressed, narrow, in ventral view over four times as long as wide, constricted at middle.

Holotype— ♂, Maywood, Alexandria Co., Va. June 4th, 1922, (McAtee). In the United States National Museum.

Paratypes— ♂, same data as holotype; ♂, Rock Creek, D. C. June 27th, 1913, (Shannon); ♂, Rock Creek Pk., D. C. May 28th, 1922, (Malloch); ♂, College Pk., Md. June 29th 1913 (Knab); ♂, Veitch, Va. June 9th 1912 (Malloch); ♂, Rosslyn, Va. July 11th 1913 (Shannon).

17. **Camptoprosopella setipalpis** n. sp.
(Figs. 7, 8.).

Yellow. Apical two or three segments of tarsi pale brown. Wing veins yellow. Dimensions: Body 2.5—3.5 mms. Wing 3—3.5 mms.

Front in profile as long as face, very convex from frontal bristles to antennae, almost or quite merging into vertical plane of face and not forming an angle with latter at antennal base. Third antennal segment twice as long as wide (1/2.0—1/2.3), broadly rounded at tip, infuscation subequal on both sides, covering apical fourth to third above and half to two thirds below. Long dorsal hairs of arista suberect basally, short hairs sparse, not more than a third length of long hairs above, with several rather long hairs on median third below outstanding from the rest. Infuscation on vertex variable, usually extending very little in front or on either side of triangle, roughly circular. Cheeks a quarter to a third eye height (1/4.0—1/2.8). Palpi narrow, infuscated on apical half to two thirds, with ten to twelve long hairs on ventral side. Anterior dorsocentrals about two thirds as long as second pair (1.8/3—2.1/3).

Superior forceps long and thin, over three times as long as wide, longer than second hypopygial segment, pointed at tips. Processes of ventral plate with broad basal parts surmounted by small blunt apical processes. Phallus about

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three times as long as wide in ventral view, widening gradually from base to bulbous tip, opening fairly large with numerous minute stylets.

Holotype—♂, District of Columbia, June (Coquillett.). In the United States National Museum.

Allotype—♀, same data as holotype.

Paratypes—1 ♂, 3 ♀♀, Dead Run, Virginia, August 3rd, (Roberts); ♂, Rosslyn, Va. July 11th (Shannon).

18. **Camptoprosopella mallochi** n. sp.
(Figs. 9, 10.)

Yellow. Legs concolorous with rest of body or else apical two or three segments of all tarsi light brown. Wing veins yellow. Dimensions: Body 2.5–3 mms. Wing 2.75–3 mms.

Profile of front and face as in *slossonae* n. sp. Third antennal segment about twice as long as wide (1/2.0–1/2.2), infuscation subequal on both sides, covering apical fourth to third above and half to two thirds below. Arista as in *setipalpis* n. sp. Infuscation on vertex not limited to triangle, usually elongate oval or roughly diamond-shaped, about twice length of triangle. Cheeks about a third eye height (1/3.6–1/3.0). Palpi narrow, infuscated on about apical half, with five to seven long ventral hairs. Anterior dorsocentrals a little less than half length of second pair (1/2.3–1/2.1).

Superior forceps of hypopygium as long as its second segment, twice as long as wide, more or less straight with parallel sides, ends rounded but with small points at extreme tips. Processes of ventral plate somewhat similar to those of *setipalpis* n. sp. with large basal part and knoblike apical processes. Phallus in ventral view three and a half times as long as wide, hardly wider at tip than at base, somewhat truncated at tip with small opening.

Holotype—♂, Glen Echo, Md. July 2nd 1922 (Malloch). In the United States National Museum.

Allotype—♀, same locality, July 12th 1922. Taken at light. (Malloch). In the United States National Museum.

Paratypes—1 ♀, same data as holotype; 1 ♂. Rosslyn, Va., July 11th 1913. (Shannon).

19. **Camptoprosopella slossonae** n. sp.
(Figs. 3, 4.)

Yellow. Apical two segments to whole of fore tarsi, apical one or two segments of other tarsi light brown. Wing veins yellow. Dimensions: Body 3–3.75 mms. Wing 3.25–4 mms.

Front in profile almost or quite as long as face, evenly convex from vertex or else rather abruptly sloping from frontal bristles, meeting plane of face at an obtuse angle at base of antennae. Face vertical or slightly retreating. Third antennal segment twice to two and a half times as long as wide (1/2.0–1/2.5), broadly rounded at tip, infuscation subequal on both sides, covering apical fourth to third above and third to half below. Long dorsal hairs of arista suberect basally, arrangement of short hairs etc.: about as in *setipalpis* n. sp. Infuscation of vertex about twice length of triangle roughly diamond-shaped, more or less pointed in front. Cheek about a third eye height (1/3.6–1/2.6). Palpi narrow, very little more than twice as wide near tip as near base, infuscated on apical two fifths to three fifths, with five or six long ventral hairs. Anterior dorsocentrals about half length of second pair (1/2.0–1/1.7).

Superior forceps of hypopygium about four thirds length of its second segment, three times as long as wide, a little narrower at base than near tips, latter with small pointed processes. Processes of ventral plate simple, more or less evenly tapering from broad bases to rounded tips. Phallus twice as long as

wide in ventral view, evenly widened from base to near tip, latter not conspicuously bulbous or otherwise differentiated from basal portion.

Holotype—♂, Mount Washington, N. H. (Mrs. Slosson). In the United States National Museum.

Allotype—♀, mounted with ♂. Same data.

Paratypes—1 ♂, 2 ♀♀, New Hampshire; 1 ♂. Black Mts., N. C. July.

20. **Camptoprosopella angulata** n. sp.

(Figs. 5, 6.)

Yellow. Apical three or four segments of fore tarsi, apical one or two segments of middle tarsi and sometimes also of hind tarsi light brown. Wing veins yellow. Dimensions: Body 3–3.5 mms. Wing 3–3.5 mms.

Profile of front and face similar to that of *setipalpis* n. sp. Third antennal segment about twice as long as wide (1/2.0–1/2.2), broadly rounded at tip, infuscation subequal on both sides, covering apical third to two fifths above and half to two thirds below. Long dorsal hairs of arista suberect basally, number and arrangement of short hairs about as in *setipalpis* n. sp. Infuscation of vertex longer than wide, but extent and shape variable, usually about one and a half times as long as wide and not more than twice length of triangle. Cheeks a fourth to a third eye height (1/3.9–1/3.0). Palpi narrow, infuscated on apical half to two thirds, with five or six long ventral hairs. Anterior dorsocentrals two thirds length of second pair or more (1.9/3–2.8/3).

Superior forceps of hypopygium slightly longer than its second segment, about three times as long as wide, abruptly and conspicuously bent in middle in lateral view, tips rounded. Processes of ventral plate simple, gradually tapering from broad bases, their lateral edges with a small setigerous angle. Phallus about twice as long as wide, not conspicuously enlarged apically, but with fairly well differentiated distal portion which is angulate laterally in ventral view.

Holotype—♂, Plummers Island, Md. July 21st 1912. (H. L. Viereck). In the United States National Museum.

Allotype—♀, same data as holotype.

Paratypes—1 ♂, 3 ♀♀, same data as types.

21. **Camptoprosopella imitatrix** n. sp.

(Figs. 23, 24.)

Orange yellow. Fore tarsi except sometimes the metatarsi, apical two to four segments of other tarsi brown. Wing veins mostly yellow, fourth and fifth veins often partly brown. Dimensions: Body 3.5–4 mms. Wing 3.25–4.25 mms.

Front in profile almost as long as face, straight and horizontal from vertex to anterior frontals, thence abruptly curved down, concave just above antennal pits, meeting vertical plane of face at an obtuse angle. Third antennal segment over twice as long as wide (1/2.1–1/2.4), infuscation heavy, covering apical fourth to third on inner side and on outer side above, reaching to basal fourth on outer side below. Long dorsal hairs of arista suberect basally, short hairs sparse above and below, hairs on apical two thirds below longer and more widely spaced. Infuscation of vertex rather large, more or less diamond or drop-shaped, pointed in front, about twice to two and a half times length of triangle, sometimes smaller and truncated in front. Cheeks over a third to nearly a half eye height (1/2.8–1/2.1). Palpi narrow, heavily infuscated on apical half to three fourths, with five to seven long ventral hairs. Anterior dorsocentrals a third to just over half length of second pair (1/2.9–1/1.7).

Superior forceps of hypopgium about three fourths length of its second segment, broad, leafshaped with pointed tips. Processes of ventral plate long slender and tapering, their bases wide apart, in lateral view evenly curved backward, with prominent setigerous tubercule at base. Phallus in ventral view nearly twice as long as wide, parallel sided on basal half, enlarged apical portion angulate laterally, opening rather large with prominent stylets.

Holotype—♂, Mexico City, Mex. (Juan Muller). In the United States National Museum.

Allotype—♀, Puebla, Mex. (Crawford). In the United States National Museum.

Paratypes—Mexico; ♀. Oaxaca (Crawford), ♀. Oaxaca April 30th (L. O. Howard), 2 ♀♀. Huipulco, August 21st 1922 (E. G. Smyth). Guatemala; ♀. El Salto, Antigua May 1st (Aldrich), 2 ♀♀. Antigua, April 2nd (Aldrich).

22. **Camptoprosopella confusa** n. sp.

1938. *Camptoprosopella* sp. 1. Shewell. Can. Ent. 70: 136. Pl. 13, Figs. 47, 48.

Yellow, including legs. Tips of tarsi sometimes pale brown. Wing veins yellow. Dimensions: Body 3—4 mms. Wing 3—3.75 mms.

Front in profile as long or nearly as long as face, usually flat and horizontal from vertex to anterior frontal bristles, thence rather abruptly sloping toward antennae, making an obtuse angle with plane of face which is vertical or very slightly retreating, sometimes evenly sloping from vertex to antennae, never completely rounded into plane of face in profile view. Third antennal segment about twice as long as wide (1/1.7—1/2.1), apex broadly rounded, infuscation subequal on both sides, covering apical fourth to half above and third to two thirds below. Long dorsal hairs of arista suberect basally, short hairs sparse, hairs below longer and more widely spaced an apical half. Infuscation of vertex variable, usually ovate or drop-shaped, about one and a half times to twice length of triangle, and about half as wide as long, usually rounded or truncate in front, but occasionally pointed. Cheeks about one third eye height (1/3.4—1/2.4). Palpi narrow, infuscated on apical third to two thirds, with five to seven long hairs on ventral side. Anterior dorsocentrals about two thirds length of second pair (1.8/3—2.3/3).

Superior forceps of hypopygium short, as long as its second segment, leaf-shaped, the tips pointed, incurved. Processes of ventral plate quite short, rather evenly tapering from broad bases which are contiguous on mid-ventral line, in lateral view slightly curved backward at tips. Phallus short, not twice as long as its greatest width, in ventral view evenly widened from base, apical portion bulbous, not strongly differentiated from basal part, opening small with sparse, and not very prominent stylets.

Holotype—♂, Ottawa, Ont., June 20th 1938. Taken on Iris leaves (Shewell). In the Canadian National Collection.

Allotype—♀, same data as type.

Paratypes—Numerous specimens from the following localities; Nova Scotia; Kentville (Gorham). Quebec; Abbotsford, Napierville (Shewell), St. Eustache, St. Louis, Montreal, Sully, Joliette, La Trappe, Boucherville (Ouellet), St. Placide, Ile Jesus, (Chagnon) Lachine (Beaulne). Ontario; Ottawa (Beaulieu, Brooks, Shewell), Jordan (Ross), Fitzroy Harbor (Peck). Massachusetts; N. Andover Col. (Tothill). Illinois; Algonquin (Coquillett), Cairo (Barber). Iowa; De Witt (Walley). North Dakota; Christenson Ranch, L. Missouri R, (Gabrielson). South Dakota; Brookings, Big Stone Cy. (Aldrich), Erwin. Indiana; LaFayette (Aldrich). Kansas; Lawrence (Curran). Arkansas; Helena (Barber). Oklahoma; Wister (Barber). Maryland; Plummers I. (Malloch). District of Columbia; Rock Creek (Shannon), Ch. Bridge (Knab and Malloch). North Carolina; Black Mts.

Collection dates in Canada range from June 5th (Ottawa) to September 1st (Kentville). In the southern localities the dates are May 28th (La Fayette, Ind.) to September 8th (Ch. Bridge, D. C.).

23. **Camptoprosopella inaequalis** n. sp.

(Figs. 1, 2)

Orange-yellow. A reddish brown stain along notopleural suture. Apical fourth to whole of fore tibiae, fore tarsi, apical two or three segments of other

tarsi brown. Wing veins yellow or brownish-yellow. Dimensions: Body 3.5–4 mms. Wing 2.75–3.5 mms.

Profile of front and face as in *confusa* n. sp. and showing same variation. Third antennal segment two and a half to three times as long as wide (usually nearly three times), more or less tapering with narrow rounded or truncated tip, concave above, inner side infuscated on apical fourth or less, outer side on apical fourth above and down to basal fourth below, rarely infuscation on both sides subequal in extent. Long dorsal hairs of arista decumbent, forming at most a 45° angle with arista, short hairs rather numerous above and below on basal half, dorsal ones sometimes half as long as long hairs. Infuscation of vertex large, as wide as long, hexagonal or roughly circular, about twice as wide as triangle. Cheeks a third to half eye height (1/2.9–1/2.0). Palpi narrow, not much more than twice as wide near tip as near base, usually less than apical half infuscated, five or six long hairs on ventral side. Anterior dorsocentrals about half length of second pair (1/2.0–1/1.6).

Superior forceps of hypopygium short, stout, widening from base to truncate, roughly serrate tips. Processes of ventral plate wide apart in ventral view, rather slender, not much curved, in lateral view, with a characteristic angle near base and slight forward curvature from there to tip. Phallus with broad funnel-shaped opening rimmed with conspicuous stylets.

Holotype– ♂, Tyler, Tex., May 5th, 1906 (F. C. Pratt). In the United States National Museum.

Allotype– ♀, Same data as holotype.

Paratypes– ♀, Point Pelee, Ont., June 18th (Ide.); ♂, ♀, Washington, D. C., (Clemons); ♀, Bennings, D. C., October 22nd (Shannon); 2 ♂♂, Chicago, Ill. June 9th (Wheeler); ♂, Hammond, Ind., June 24th (Aldrich); ♀, Onaga, Kans.; ♀, Rocky Ford, Colo., July; ♂, Georgia; ♂, S. Georgia (Morrison); ♀ (?), Alabama (Baker); ♂, Marfa, Tex., June 13th (Aldrich); ♀, Denison, Tex., June 22nd (Barber); ♂, Dallas, Tex., September 4th (Pratt); ♂, Roswell, N. Mex., August (Cockerell); ♀, Socorro. N. Mex. (Williston); ♀, Mesilla, N. Mex., Oct. 26th (Cockerell); ♀, Mescaiero, N. Mex. October 2nd. On Bigelovia (Cockerell); ♀, Northern N. Mex. (Weise); ♂, New Mex. (Cockerell); ♂, ♀, New Jersey.

24. **Camptoprosopella decolor** n. sp.
(Figs. 31, 32.)

Front yellow, usually contrasting with orange-yellow of thorax in dried specimens. Mesonotum with red-brown stripes above humeri and reddish stain along notopleural suture, sometimes with less distinct median stripe anteriorly and stripes between dorsocentral and supraalar rows. Fore tarsi and apical two segments of other tarsi brown, rest of legs yellow. Wing veins yellow to brown. Dimensions: Body 2.5–3.5 mms. Wing 2.75–3 mms.

Front short, less than half as long as wide, in profile view shorter than face. very convex, sloping into vertical plane of face anteriorly, not making an angle with it at antennal bases. Third antennal segment over twice to two and a half times as long as wide (1/2.2–1/2.5), on inner side with faint infuscation at extreme tip, on outer side faintly infuscated on lower edge to near base, antennal infuscation much fainter than that of vertex or palpi. Long dorsal hairs of arista entirely decumbent, short hairs numerous below on basal third, sparser above where they are nearly half as long as long hairs, several rather long outstanding hairs on median third below. Infuscation of vertex usually more or less elongate oval, about twice length of triangle, sometimes nearly circular but not twice as wide as triangle. Cheeks about a third eye height (1/3.5–1/2.6). Palpi narrow, not over twice as wide near tip as near base, infuscated on apical fourth to half, with four to seven long ventral hairs. Anterior dorsocentrals half to two thirds length of second pair (1/2.0–1/1.5).

Superior forceps of hypopygium about three fourths length of its second segment, rather elongate, widening gradually from base, with blunt tips. Processes of ventral plate long and strong, extending well beyond distal edge of second segment, uniformly tapering and curved from base to large rounded tips. Phallus more than three times as long as wide in ventral view, slightly enlarged and bulbous on apical third, with a backward-curling lip at apex behind.

Holotype—♂, Boerne, Texas, October 7, 1905 (F. C. Pratt). In the United States National Museum.

Allotype—♀, Brownsville, Texas, May 18, 1904 (H. S. Barber). In the United States National Museum.

Paratypes—2 ♂ ♂, 1 ♀, Same data as holotype; 1 ♂, Same data as allotype; 2 ♀ ♀, Brownsville, Tex., 1924. Taken on Avocado; 1 ♀, Brownsville, Tex., July 16, 1906, "Bred cotton square"; 1 ♂, 1 ♀, Victoria, Tex., July 8, 1907 (J. D. Mitchell); 1 ♂, Arlington, Tex., August 12, 1905 (F. C. Bishopp); 1 ♀, Pierce, Tex., March 22, 1907 (J. D. Mitchell); 1 ♀, Dallas, Tex., June 10, 1907 (F. C. Bishopp); 1 ♂, 1 ♀, Knoxville, Tenn., July 3rd (C. C. Hill).

25. **Camptoprosopella media** n. sp.
(Figs. 19, 20.)

Orange yellow. Mesonotum usually with median reddish-brown vitta on anterior half, occasionally also with faint vittae above humeri and between dorsocentral and supraalar rows, a brownish stain along notopleural suture. Apices of fore tibiae, fore tarsi, apical two or three segments of other tarsi light brown. Wing veins yellow. Dimensions: Body 3—3.5 mms. Wing 3 mms.

Front in profile almost as long as face, more or less flat and horizontal from vertex to posterior frontals, thence abruptly bent and sloping to antennae, sometimes concave above antennal pits, meeting vertical plane of face at an obtuse angle. Third antennal segment over twice to two and a half times as long as wide (1/2.2—1/2.5), infuscation faint, noticeably brown only at extreme tip, extending to basal fourth below on outer side, usually less extensive on inner side, not covering more than apical fourth or third. Long dorsal hairs on arista somewhat decumbent basally, short hairs sparse, a few outstanding hairs on median third below. Infuscation of vertex rather large, variable in shape, circular, oval, or drop-shaped, sometimes sharply pointed behind, not more than twice length of triangle and about one and a half times its width. Cheeks about a third eye height (1/3.2—1/2.6). Palpi enlarged apically, two and a half to three times as wide near tip as near base, heavily infuscated on apical third to half, with four to six long ventral hairs. Anterior dorsocentrals about half length of second pair (1/2.2—1/1.8).

Superior forceps of hypopygium about half length of its second segment, in ventral view about twice as long as wide, not much narrower at bases than at truncate tips. Processes of ventral plate short, slender, not much curved, evenly tapering, with small setigerous tubercles at bases which are wide apart. Phallus in ventral view nearly three fourths as wide as long, narrowest at middle, enlarged apical portion deeply emarginate posteriorly, opening large with prominent stylets.

Holotype—♂, Tampico, Mexico, December 6th (F. C. Bishopp). In the United States National Museum.

Allotype—♀, Same data as holotype.

Paratypes—1 ♂, 3 ♀ ♀, Tampico, Mexico, December 5th, 6th (F. C. Bishopp); 1 ♀, Vera Cruz, Mex. (Crawford).

26. **Camptoprosopella acuticornis** n. sp.

Yellow. Apical one or two segments of all tarsi pale brown. Wing veins yellow. Dimensions: Body 3 mms. Wing 3.25 mms.

Front, in profile, as long as face, sloping from vertex, straight, with slight concavity above antennal bases. Face noticeably retreating, angle between it and front 90°. Third antennal segment nearly three times as long as wide (1/2.7), dorsal and ventral edges straight, uniformly tapering to a pointed tip, without trace of infuscation. Long dorsal hairs of arista very decumbent and curved, short hairs very numerous above and below, nearly as long as the long hairs above. Infuscation of vertex large, almost circular, twice length of triangle. Cheeks a third eye height. Palpi greatly widened on apical half, three times as wide near tip as near base, apical half black, five long ventral hairs. Anterior dorsocentrals not clearly visible, but evidently about half length of second pair or a little more.

Hypopygium apparently almost identical with that of *confusa* n. sp., but the opening of the phallus somewhat larger, with more numerous stylets. (This structure in the unique type specimen is somewhat teneral and difficult to study or describe even when dissected. The phallus and ventral plate are the only undistorted features.)

Type—♂, South Dakota (J. M. Aldrich). In the United States National Museum.

27. **Camptoprosopella texana** n. sp.

(Figs. 13, 14.)

Front yellow, in dried specimens usually contrasting with orange-yellow of thorax. Mesonotum with a median reddish brown stripe on anterior half, short stripes above humeri and longer more suffuse ones between dorsocentral and supraalar rows, these last sometimes faint or absent. Apical one to four segments of anterior tarsi, apical one or two segments of other tarsi light brown, rest of legs yellow. Wing veins yellow. Dimensions: Body 3–3.5 mms. Wing 2.5–3.25 mms.

Front and face in profile as in *verticalis* Lw. Third antennal segment about twice to two and a half times as long as wide (1/2.2–1/2.6), usually without trace of infuscation but sometimes faintly darkened at extreme tip. Long dorsal hairs of arista decidedly decumbent, short hairs numerous above and below, those near middle above about three fourths length of long hairs. Infuscation of vertex rather small, ovate to nearly circular, not twice length of triangle nor twice its width, not extending behind posterior ocelli. Cheeks about a fourth to a third eye height (1/3.8–1/2.9). Palpi distinctly widened on apical half, three times as wide near tip as near base, black on apical third to half, four to six long ventral hairs. Anterior dorsocentrals over three fourths length of second pair (3.1/4–3.5/4).

Superior forceps of hypopygium short, less than length of its second segment, spoon-shaped with pointed tips. Processes of ventral plate small and slender, not much thicker at base than at rounded tips, greatly curved. Phallus rather short and small, about twice as long as wide, about a third wider at tip than at base in ventral view, apical half rather conspicuously differentiated from basal half.

Holotype—♂, Victoria, Texas, May 15, 1907 (J. D. Mitchell). In the United States National Museum.

Allotype—♀, same locality, April 1, 1907, on *Callirrhoe involucrata* (J. D. Mitchell). In the United States National Museum.

Paratypes—7 ♂♂, 3 ♀♀, Victoria, Tex., April 1st, May 3rd, 15th, 18th, 1907, April 17th, July 2, 1912. (J. D. Mitchell); 1 ♂, 3 ♀♀, Tyler, Tex., May 5, 1906 (F. C. Pratt); ♀, Cotulla, Tex., May 10, 1906 (F. C. Pratt); ♀, Galveston, Tex., July 10, 1917 (J. M. Aldrich); 1 ♂, 4 ♀♀, Galveston, Tex., June 5, 1900 (W. M. Wheeler).

28. **Camptoprosopella verticalis** Loew
(Figs. 15, 16.)

1861. *Pachycerina verticalis* Loew. Cent. I. 82 (Fla.)
1898. *Pachycerina claripennis* Coq. Can. Ent. 30: 280. (Fla.) Misprinted *clavipennis*.

Front yellow, usually paler than orange-yellow of thorax in dried specimens. Mesonotum with a median red-brown stripe extending nearly or quite to acrostical bristles, and lateral stripes from humeri to inner postalar bristles. Fore tarsi, sometimes apices of fore tibiae, apical two or three segments of other tarsi brown, rest of legs yellow. Wing veins yellow to brown. Dimensions: Body 2.5—3.5 mms. Wing 2.5—3.5 mms.

Front in profile as long as face, evenly sloping from vertex, flat or very slightly convex, sometimes concave just above antennae. Face noticeably retreating, meeting plane of front at an angle of about 100°. Third antennal segment two and a half to three times as long as wide, not infuscated, though frequently slightly browned at apex and below on outer side. Long dorsal hairs of arista entirely decumbent, short hairs very numerous above and below, very long above, at the middle almost or quite as long as the long hairs, no rather long outstanding hairs on median third below. Infuscation of vertex large, diamond-shaped, pointed in front, more than twice length of triangle, with conspicuous backward extension onto occiput between post-ocellar bristles, sometimes more or less elongate oval or truncate in front. Cheeks a fourth to over a third eye height (1/4.0—1/2.6). Palpi very much widened on apical half, nearly four times as wide near tip as near base, enlarged part black, four to six long ventral hairs. Anterior dorsocentrals usually well over three fourths length of second pair, rarely as little as two thirds. (2.0/3—7.4/8).

Superior forceps of hypopygium short, less than length of its second segment, somewhat spoon-shaped, the pointed tips incurved. Processes of ventral plate small, slender, in ventral view slightly curved, except tips which are rather abruptly bent inward and pointed on inner side, with a fairly strong seta at base laterally. Phallus small, in ventral view twice as long as wide, evenly widened from base, with more or less truncate tip.

Thirty specimens from Florida: Orlando, Feb. 7th, 9th, 19th, (Ainslie); Jacksonville, Biscayne Bay, Atlantic Beach, (Mrs. Slosson); St. Augustine, (Coquillett); Ft. Myers, Nov. 13th, Newberry, Nov. 19th; Tampa, May 2nd (Van Duzee); Two specimens from Georgia: "Ga."; Tifton, Oct. (Wheeler).

29. **Camptoprosopella dolorosa** Williston

1903. *Pachycerina dolorosa* Williston, in Adams; Kans. Univ. Sci. Bull. II:37 (Colo.)
1907. *Camptoprosopella melanoptera* Hendel, Wien. Ent. Zeit. 26:224. (Mex.)

This species is the genotype. It is readily distinguished from all other known New World species by its comparatively large size and greatly darkened wings. Front long, over four fifths as long as wide, angle between front and face about 90°. Face greatly retreating above, suddenly produced just above oral margin. Third antennal segment very long, three to nearly four times as long as wide, tapering, infuscated at tip and below often nearly to base. Long dorsal hairs of arista decumbent, short hairs very numerous above and below but not nearly as long as the long hairs. Vertical infuscation large, elongate, extending back onto occiput between and behind postocellars. Dark, more or less triangular spots between antennal bases and eyes. Dimensions: Body 5 mms. Wing 4.5 mms.

Thirty specimens examined from Colorado, New Mexico, and Mexico.

UNRECOGNIZED AND DOUBTFUL SPECIES.

albiseta Hendel.

Camptoprosopella albiseta Hendel. Wien. Ent. Zeit. 26; 225. 1907. (Java).
Melanopachycerina albiseta: Malloch. Proc. U. S. N. M. 74 Art. 6. p. 19, 1929.
Syn. *Camptoprosopella angustilimbata* De Meij., (Malloch, Ibid.)

angustilimbata De Meijere.

Camptoprosopella angustilimbata De Meij., Tijd. v. Ent. 57:234, 1914. (Java) See *albiseta* Hendel.

cincta Loew.

Sapromyza cincta Loew. Cent. I. 18. 1861. (Cuba).

Camptoprosopella cincta: Melander. Psyche 20:76. 1913. As syn. of *vulgaris* Fitch.

Either *diversa* Curran or *cubana* n. sp. is likely to prove the same as this species.

notatifrons Brunetti.

Camptoprosopella notatifrons Brunetti, Rec. Ind. Mus. VIII. p. 181, pl. 1913. (N. E. Assam.)

I cannot say to what genus this species belongs but it is apparently not a *Camptoprosopella*. The figure of the head shows three pairs of rather short frontal bristles, all directed inward. The facial grooves diverge widely and pass below the ventral edges of the eyes, and there are other incompatible characters.

ocellaris Townsend

Sapromyza ocellaris Towns. Can. Ent. 24:303, 1892. (N. Mex.)

Camptoprosopella ocellaris: Melander, Psyche 20:76, 1913. As syn. of *vulgaris* Fitch.

Several points in the description of this species, namely the almost circular infuscation of the vertex, the unequal infuscation of the two sides of the third antennal segment, and the coloring of the legs, suggest that it may be the same as *inaequalis* n. sp. Location of type ? (Not in United States National Museum).

plumata Van der Wulp.

Sapromyza plumata Wulp, Tijds: v. Ent. 10:159. 1867.

Camptoprosopella plumata: Melander, Psyche. 20:76, 1913. As syn. of *vulgaris* Fitch.

A middle-western species that has has been identified with *vulgaris* Fitch by all subsequent authors.

vulgaris Fitch

Chlorops vulgaris Fitch, First N. Y. Rep. p. 300. 1856 (N. Y.)

Camptoprosopella vulgaris: Melander, Psyche 20:76, 1913.

Mr. D. G. Hall tells me that the single type specimen of this species is a female. It is just possible that it can be associated with one of the more readily recognized species described herein, but if, as is likely, it falls into either the *borealis* or *slossonae* group, it is difficult to see how this old name can be correctly applied in the future.

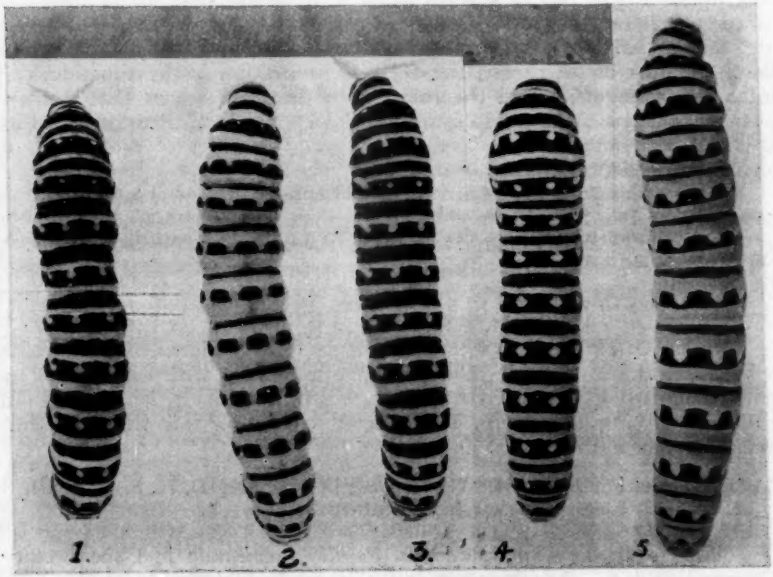
PAPILIO BREVICAUDA IN CAPE BRETON ISLAND, N. S. (LEPID.) *

BY J. McDUNNOUGH,
Ottawa, Ont.

I first made the acquaintance of *Papilio brevicauda* in Cape Breton in the summer of 1936 when engaged on an Insect Faunal Survey of this region. We (*i.e.*, my assistant Mr. T. N. Freeman and myself) had made our headquarters at the picturesque town of Baddeck on Little Bras d'Or Lake and on the afternoon of July 12th I decided to row over to the small island opposite the town, which forms the eastern side of the harbour; this island is heavily wooded down to the water's edge except for a small strip of sandy beach on the west side, which is grown over with various coarse grasses and numerous low plants, chief among which is a flourishing colony of lovage (*Ligusticum scothicum*), a plant which to my knowledge does not accur on the mainland in this region. Scarcely had I landed on the above mentioned sandy beach when I captured a very tattered female of the typical form of *Papilio ajax* Linn. (*asterius* Cram.); 50 yards further on another *Papilio* was flying and this, on being netted, turned out to be a very fine female of *brevicauda* Saund. No further Papilios were seen, either during that afternoon or on other visits to the island; it occur-

*Contribution from the Division of Entomology (Systematic Entomology) Department of Agriculture, Ottawa.

red to us, however, that a search for larvae might be profitable and during the following week our efforts were rewarded to the extent that about 25 larvae, in all stages of growth, were secured, exclusively from lovage. During the course of breeding these larvae to maturity it was noted that certain ones fed up very rapidly and pupated a week or more ahead of the other, slower feeders; it was also noted that two forms of larvae occurred, a dark form in which the black cross-bands on the segments were very broad and a lighter form in which these bands were narrower and the green color predominated. With the idea in the back of our minds that a possibility existed of associating these color-forms with the two very distinct types of *Papilio* captured earlier in the season, a rough attempt at segregation was made; pressure of other work, however, prevented this being carried out very thoroughly and certain intermediate forms proved difficult to place. By August 1st when we left Baddeck practically all the larvae had pupated and those pupae hard enough to stand the transit were shipped back to Ottawa. On our return in early September it was found that a



Larva of 1. *P. ajax* from *Daucus* (St. Andrews, N. B.).
2. *P. brevicauda bretonensis* from *Ligusticum* (Baddeck, N. S.).
3. *P. ajax* from *Ligusticum* (Baddeck, N. S.).
4. & 5. *P. ajax* from *Cicuta* (Ottawa region).

certain proportion of the pupae (about 6) from those larvae that had fed up quickly had emerged—either in transit or immediately after reaching Ottawa—as a second generation of typical *ajax;* the others were evidently due to hibernate.

The hibernating pupae were taken from their winter quarters in early January and given room temperature and the resulting imagoes proved to be 5 typical *ajax* (3 ♂ and 2 ♀), all emerging early in February, and 15 (6 ♂, 9 ♀) *brevicauda;* these latter did not start to emerge until late in February and continued to appear singly and at intervals during the next three months, the last imago (a female) appearing on June 10. Six of these *brevicauda* have been distributed to other collections and the data is at present unavailable but of the remaining nine, seven were associated with larvae which had been designated as pale, one was from an intermediate and one from a dark form; of

the 5 *ajax* three were from dark larvae, one from an intermediate and one from a light form.

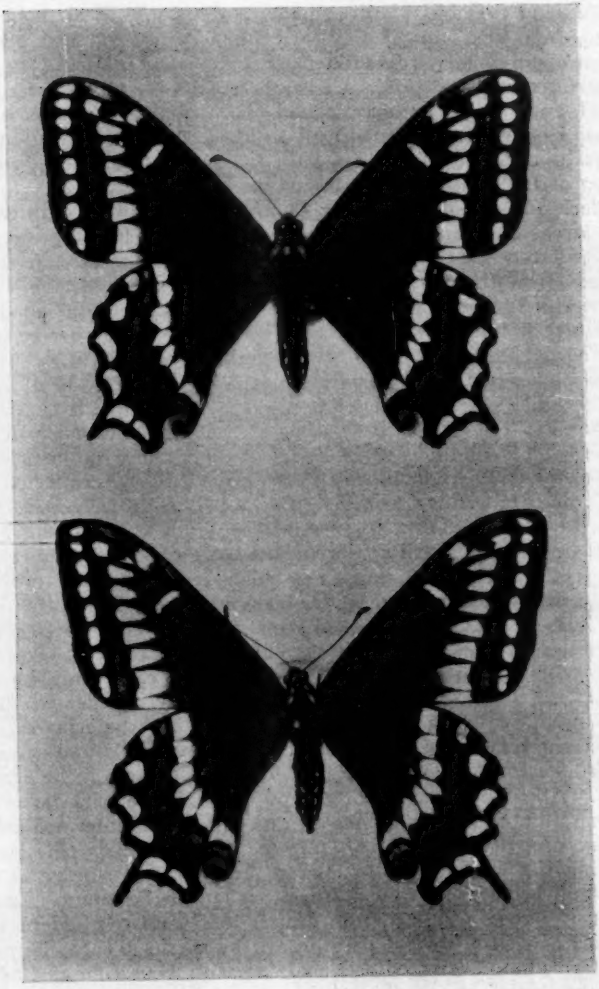
It was felt that, while the indications pointed to *brevicauda* being rather definitely associated with a pale larva, no final conclusions could be drawn from these results on account of the hurried manner in which the material had been separated and that, when feasible, a second visit to Baddeck for more careful observations on further material was advisable. This visit was made in July, 1938, and previous to this, during a short stay at St. Andrews, N. B., in June and early July, typical *ajax* of the first generation had been captured and about two dozen larvae secured from wild carrot (*Daucus carota*) which grows abundantly in this region. All these St. Andrews larvae were of the dark form (fig. 1) and showed little variation. Incidentally it might be mentioned that the majority of the pupae formed by these larvae emerged in August of the same year as a second generation, only one or two hibernating and emerging in the spring of 1939; all imagoes were of the normal *ajax* type.

Baddeck was reached on July 15 and immediately an intensive search for *Papilio* larvae on the island was instituted; for the first few days they were difficult to find but later appeared in large numbers, mostly in early instars. About 50 larvae in all were taken feeding on *Ligusticum;* although *Cicuta* and *Daucus* also grew in close proximity no larvae could be found on these plants. On the mainland, however, along the edge of the water a few larvae were found on *Daucus;* these proved to be all of the dark form, very similar to the St. Andrews larvae, and either emerged as a second generation of *ajax* or produced similar adults the following spring.

No attempt was made to separate the *Ligusticum*-feeders in the early instars, although considerable variability was noted; lack of knowledge of the parents and of the exact instar in which each larva was when collected made such work unfeasible. If it were possible to secure eggs from known females—as, for instance, by watching them while egg-laying—it is felt that some interesting results might be obtained from a study of the earlier stages. As on the previous occasion the mature larvae separated very readily into the two forms, *viz.* dark and light. In the dark form (fig. 3) the black transverse band occupied roughly the median half of each abdominal segment and entirely encircled the orange spots posteriorly; in the light form (fig. 2) the black areas were reduced to individual patches, as a rule entirely separated from each other by the orange spots; four larvae were somewhat intermediate between the two forms, with a tendency towards pale, and these were isolated. The pale larvae constituted about 60% of the remainder, fed up somewhat more slowly and pupated in the main a week later than the dark ones; pupation of the entire lot was complete by August 1. About one-quarter of the pupae from the dark larvae produced a second generation of *P. ajax* in August and one of the intermediates emerged as a male *ajax* also; the balance, *including the entire lot from pale larvae,* hibernated. During the winter the pupae were kept in cold storage at a freezing temperature and brought into the warm room late in February. Emergence of the "dark-form" pupae occurred from March 13-21 and resulted in 4 ♂, 6 ♀, of normal *ajax* as well as several parasites of the species *Trogus vulpinus* Grav. A single "intermediate" emerged as a male *ajax* on March 20 and on the same date one of the "pale" pupae also produced a similar specimen; there is, however, a slight element of doubt regarding this latter and a possibility that a "dark" pupa was mixed with the pale ones. It should be noted that *none* of the dark larvae produced *brevicauda* adults nor was there any sign of intergradation, such variation as was present being no more than is usual in the species and consisting chiefly in the reduction or entire absence of the yellow spot at at apex of cell on hindwings in the male.

The first emergence of *brevicauda* occurred on March 15 from an "in-

PLATE 22



P. brevicauda bretonensis var. nov. Holotype ♂ and Allotype ♀.

termediate" pupa, producing a male. Following this 5 or 6 *Trogus vulpinus* emerged, much to our regret as this constituted a 15% parasitism; the subesquent emergences of *brevicauda* from "pale" pupae were as follows: 1 ♂, March 21; 1 ♂, April 3; 1 ♂, April 5; 1 ♀, April 10; 2 ♀ April 13; 1 ♀, April 17; 1 ♀, April 19; 1 ♂, April 20; 1 ♀, April 21; 1 ♀, April 28; 1 ♀, May 4; 1 ♀, May 8; 1 ♀, May 11. Six pupae have not yet produced imagoes.

The similarity of the breeding results obtained on both occasions would apparently lead to the following conclusions:

(1) *Papilio ajax* and *P. brevicauda* exist side by side in the Baddeck region of Cape Breton as separate entities and cannot be considered as forms of a single species.

(2) *Papilio ajax* is partially double-brooded, the spring emergence occurring within a brief space of time and being earlier than that of *brevicauda*.

(3) The mature larva of *P. ajax* is almost entirely of the dark form with broad black transverse bands enclosing the orange spots; a very small percentage tends towards a lighter form with reduced black-banding. (This would fall in line with color-forms of *ajax* larvae as found in the Ottawa region where both light and dark forms (figs. 4 and 5) are prevalent).

(4) *Papilio brevicauda* is single-brooded, emergence taking place over an extended period of time up to early July.

(5) The mature larva of *P. brevicauda* is much paler than that of *ajax*, the black bands being generally entirely separated into rectangular patches by the orange spots. (This is quite at variance with the observations of Mead in Newfoundland on typical *brevicauda* (*vide* Edwards, Butt. N. Am. II, Pl. VIIIB and text) where both types of larvae are said to produce similar imagoes).

As far as I know *ajax* and *brevicauda* have, up to the present, never been observed flying in a single locality. It is rather futile to speculate as to how this came about but a not too improbable theory would be that *brevicauda* is the age-old inhabitant of the lands bordering on the Gulf of St. Lawrence, descended at some remote period from a *machaon*-like ancestor,but now sufficiently far removed to be worthy of specific rank. *Ajax* is possibly a much more recent arrival having gradually filtered in from New Brunswick and Nova Scotia on the wings of the prevalent south-west winds and representing a member of the same group whose original place of origin was somewhere in the Middle or Southern Atlantic States.

Our Cape Breton *brevicauda* is in many respects intermediate between the typical Newfoundland form and the race which I have described as *gaspeensis*. The wing expanse is more nearly that of *brevicauda*, being noticeably larger than *gaspeensis*. The size of the postmedian row of yellow spots on both wings is, however, closer to that of *gaspeensis*, only a very occasional specimen approaching in the breadth of this band the typical form. There is considerable tendency in Cape Breton specimens towards an orange suffusion of the yellow areas, especially on the costal spots of both the postmedian and subterminal series which almost invariably show orange coloration; in *gaspeensis* such suffusion occurs rarely and is then confined to the first spot of the subterminal row on hindwings. The pale intravenular dashes in the fringes of the forewing show a decided tendency toward obsolescence in a number of our specimens; in some the fringes are practically entirely black, others, however, show the normal dashes and the character can by no means be considered a constant one; I have, however, noted no such tendency in either typical *brevicauda* or in *gaspeensis*. Under the circumstances I believe there is justification for proposing the racial name BRETONENSIS for this interesting variety.

Holotype—♂, Baddeck, N. S. (bred at Ottawa, March 1, 1937, from larva on *Ligusticum scothicum*); No. 4549 in the Canadian National Collection, Ottawa.

Allotype—♀, same data (bred, April 19, 1939).

Paratypes—5 ♂, 13 ♀, all from Baddeck larvae on *Ligusticum*, bred at various dates, March—June 1937 and 1939.

A NEW MEALYBUG PARASITE (HYMENOPTERA: SCELIONIDAE)

BY C. F. W. MUESEBECK,

Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

The purpose of this paper is to provide a name for an undescribed species of the platygasterine genus *Allotropa* which has been encountered in Canada as a parasite of the mealybug *Phenacoccus aceris* (Sign.). Brief notes are also given on the single previously known Nearctic species of *Allotropa* and on another species which was erroneously described in that genus.

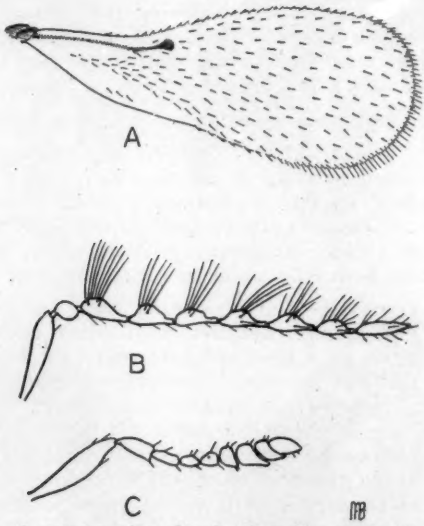


Fig. 1.—*Allotropa utilis* *A*, anterior wing of male; *B*, male antenna; *C*, female antenna. Drawn by Mary F. Benson.

Allotropa utilis new species

(Fig. 1)

Closely resembling the following species, but distinguished from that form by its more shining mesoscutum and scutellum, indistinctness of occipital carina, transversely rugulose sculpture of occiput, distinct bend of subcosta well before apical knob, broader anterior wing, and usually relatively narrower abdomen; also, in the male, by the much shorter marginal cilia of anterior wing and darker antennae and legs.

Female.—Length 0.9 mm. Head strongly transverse, slightly wider than thorax; vertex minutely punctate; occiput finely transversely rugulose, shining; occipital carina indistinct; face delicately reticulate, faintly transversely lineolate below toward the sides; temple receding abruptly from eye margin; lateral ocellus less than half its diameter from eye; malar space more than half as long as scape, antennae as shown in Fig. 1, *C*.

Thorax broader than high; mesoscutum very weakly punctate, shining; scutellum much broader than long, without distinct punctures, faintly reticulate

laterally, shining; sulcus at base of scutellum finely foveolate; side of pronotum delicately longitudinally lineolate below; mesopleuron polished; metapleuron and propodeum thickly covered with pubescence. Anterior wing much broader than abdomen; subcosta distinctly bent toward anterior margin some distance before terminal knob.

Abdomen at least as long as thorax but usually definitely narrower, acute at apex, smooth; first tergite with a transverse foveolate line at base; second much longer than broad, with two or three weak longitudinal foveolae medially at base and a shallow impression each side of these.

Black; antenna dark brown, with base and apex of scape, pedicel, and first three flagellar segments brownish yellow; legs piceous to black, trochanters, more or less of anterior tibia, bases of middle and hind tibiae, and most of fore and middle tarsi paler; wings hyaline, subcosta dark brown.

Male.—Like the female except for the markedly different antennae (Fig. 1, *B*) and the less acute abdominal apex; the antennae piceous to black, with the attenuated parts of flagellar segments pale.

Type locality.—Berwick, Nova Scotia, Canada.

Host—Phenacoccus aceris (Sign.).

Type.—U. S. National Museum No. 53068.

Described from 27 females and 49 males all reared from the above host by F. C. Gilliatt, as follows: Type, allotype, and 26 paratypes from the type locality, June 28, 1934; 28 paratypes, also from the type locality, reared in July 1936 and July 1937; and 20 paratypes from Annapolis Royal, Nova Scotia, November 28, 1933.

Allotropa ashmeadi, new name

Iphetrachelus americanus Ashmead, Bull. U. S. Nat. Mus. 45: 250, pl. 11, fig. 1, 1893 (not *Allotropa americana* Ashmead, 1887).

This species was described from a single male specimen, but Ashmead's illustration is inaccurate in showing well defined notaulices, which are entirely lacking in the type.

Face a little smoother medially than in *utilis;* occiput granular and dull and occipital carina usually distinct; mesoscutum and scutellum more closely sculptured and rather dull; anterior wing of female not or barely wider than abdomen, which is about as broad as thorax; marginal cilia of anterior wing in male conspicuously longer than in *utilis,* especially on anterior margin, and male antennae and legs brownish yellow.

In addition to the type, which is from Arlington, Va., and is without host data, the U. S. National Museum has a series of 27 specimens reared from an uncertainly identified species of mealybug at New Orleans, La., in June and July 1924, under Quaintance Nos. 26702 and 26703, of the Bureau of Entomology and Plant Quarantine.

Acerota americana (Ashmead), new combination

Allotropa americana Ashmead, Canad. Ent. 19: 125, 1887; Bull. U. S. Nat. Mus. 45: 250, 1893.

Monocrita melanostropha Ashmead, Canad. Ent. 19: 126, 1887. New synonymy.

Acerota caryae Ashmead, Canad. Ent. 19: 128, 1887; Bull. U. S. Nat. Mus. 45: 262, 1893. New synonymy.

Acerota melanostropha (Ashmead), Bull. U. S. Nat. Mus. 45: 262, 1893.

The original description of *americana* recorded the type as a male but, as was indicated in Ashmead's redescription of the species in 1893, it is actually a female. Because of the position of the antennae in this specimen it is not readily determined whether they are 9- or 10-segmented, and Ashmead's error in counting the segments led him to place the species in *Allotropa.* The antennae are definitely 10-segmented, and in every essential the type of *americana* appears to agree with the types of *melanostropha* and *caryae.* That *caryae* is

identical with *melanostropha* was recognized by R. M. Fouts some years ago although the synonymy was not published. Fouts had placed a label with the type series of *caryae* reading "This sp.=*melanostropha.*" His failure to observe that *Allotropa americana* Ashmead is the same species was presumably due to the location of the type of *americana* in a different part of the collection. In my opinion there can be no doubt that all three names apply to a single species, although there may still be some question that this form is properly placed generically. However, until the limits of various genera in this section of the Platygasterinae are more satisfactorily defined it seems advisable to leave the species in *Acerota.*

All known specimens of *Acerota americana* are from Jacksonville, Fla.

The types of *americana, melanostropha,* and *caryae* are all in the United States National Museum.

THE LIFE HISTORY OF ALLOTROPA UTILIS MUES., A HYMENOPTEROUS PARASITE OF THE ORCHARD MEALY BUG IN NOVA SCOTIA

BY F. C. GILLIATT,*

Dominion Entomological Laboratory, Annapolis Royal, N. S.

Soon after the discovery of the mealy bug *Phenacoccus aceris* Sig. in the orchards of Nova Scotia in 1932, a parasite of much importance was found attacking this pest. This is a small hymenopterous species described in this issue by Dr. C. F. W. Muesebeck as a new species, *Allotropa utilis* Mues.

Considerable time has been devoted to the study of *A. utilis* so that its life-history and habits under Nova Scotia conditions are now fairly well known. As shown in figure 1, hatching of the mealy bug eggs begins only a few days earlier than the emergence of the adult parasites; furthermore, the numbers of both the newly-emerged nymphs and of the parasites reach their maxima at approximately the same time in the orchard. Thus at any one time, the numbers of the parasite are approximately proportionate to those of the host. It should be noted, however, that out of 500 adult parasites studied in 1937, there were 428 males and 72 females, the latter being only 14.4% of the total.

All attempts to obtain oviposition under controlled conditions in the insectary proved unsuccessful, and it was not until the summer of 1937 that this act was observed. On July 23, the adult parasites were ovipositing freely in an orchard near Annapolis Royal, N. S. They were not easily disturbed in their persistent search over the leaves for the host. Their movements were rather slow, the antennae being used in a somewhat methodical manner to search among the pubescence of the leaves. The antennae are apparently the only sensitive organs used by the parasite for this purpose, touching the host with a leg or some other part of the body resulting in no positive response. Upon making contact with the host, the parasite first gave a cursory examination of the dorsal surface with the antennae, then quickly reversing its position, the abdomen was lowered and the ovipositor almost instantly thrust into the nymph. A few seconds were sufficient for the whole operation. Oviposition usually occurred on the dorsal surface near the middle of the abdominal segment. In some instances, however, the first touch of the parasite caused the nymphs to quickly lift the abdomen to the vertical position, the ovipositor then being frequently thrust into the ventral surface of the abdomen. The host was distinctly sensitive to this disturbance but quite unable to offer any effective resistance. It almost at once began to wander aimlessly over the leaf but in a few moments settled down to a fresh feeding position.

There appeared to be some discrimination in host selection. Often the parasite, after exploring most of the dorsal surface of the host, moved away to search again without the slightest attempt at oviposition. Just what prompted

*Deceased April 28, 1938.

PLATE 23

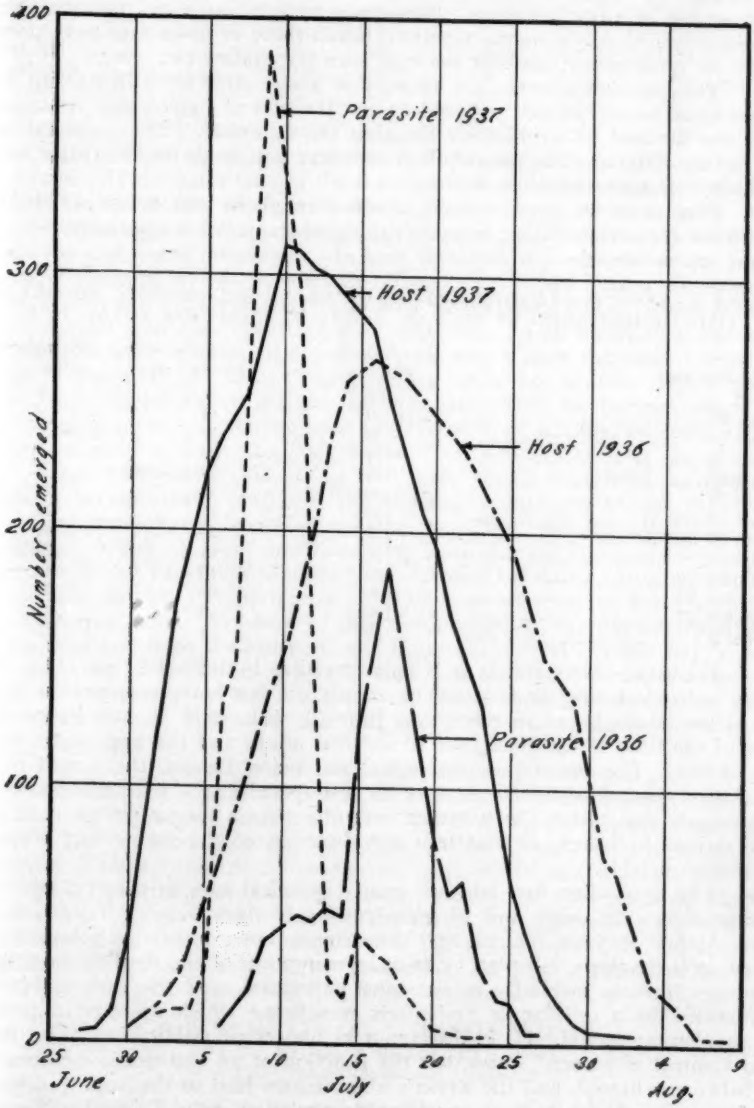


Figure 1.—Graph showing time of emergence of host (young nymphs) and parasite (adults) in 1936 and 1937, Annapolis Royal, N. S.

this selection was not definitely determined, although hosts previously parasitized may have had some repellent effect upon the parasites. Nevertheless, in approximately 58% of the parasitized nymphs, only one egg was present. In the remaining 42%, two eggs were common, three frequently found, and as many as five in a few instances. Frequently nymphs contained parasite eggs in various stages of development, especially when three or more eggs were present. There were no indications that the eggs were polyembryonic.

The parasites attacked on an average about three hosts in half an hour. There were usualy periods of rest between the acts of ovipositing, when much time was devoted to stroking or cleaning the antennae. The antennae were grasped near the head by the fore legs and drawn through for the entire length. This was repeated a number of times.

Dissections of nymphs were made throughout the season of 1937 to determine the period during which hatching of the parasite eggs occurred. The results are as follows:

TABLE 1.—RESULTS FROM DISSECTION OF MEALY BUG NYMPHS, TO OBTAIN TIME OF HATCHING OF EGGS OF *A. UTILIS*, ANNAPOLIS ROYAL, N. S.

Date Dissected	Nymphs dissected	Nymphs with parasitic eggs	Nymphs with parasitic larvae
July 31	20	12	0
August 2	30	14	0
August 5	30	13	1
August 10 and 11	70	29	7
August 13	50	18	8
August 16	100	34	22
August 20 and 21	100	38	24
August 30 and 31	100	26	40
September 8	100	18	39
September 13	100	16	44
September 20	100	12	34
September 27	100	6	44
October 5	50	3	20

From the above results it is apparent that in 1937 the eggs of *A. utilis* began to hatch during the first days of August, the first being recorded on August 5. As the adults began to emerge on June 30, there were 36 days between the time of the time of the emergence of the first adult, and the appearance of the first larvae. The pre-oviposition period not being known, the length of the incubation period is therefore more or less speculative. The dissection data also suggest that either the parasites oviposite over a longer period than field observations indicated, or else that the duration of the incubation period is somewhat variable.

The eggs when first laid are nearly spherical but, as they enlarge, they become somewhat ovate and in some cases a distinct bulge develops on one side. At first they are whitish and transparent, but a somewhat granular condition soon develops, followed by faint segmentation of the developing embryo. The eggs increase markedly in size after deposition, and the embryo becomes surrounded by a cellular or embryonic membrane which appears to prolong the incubation period. H. L. Sweetman in his recent publication "The Biological Control of Insects" states that the function of an embryonic membrane is probably nutritional, and the writer's observations lead to the same conclusion. There were indications that considerable variation existed in the degree of development of the embryo before the rupture of the cellular membrane. The earlier hatched parasites appeared to have developed less, on the average, than those emerging at a later date. Table II shows that the eggs increase in size from a minimum length of .064 mm. (shortly after the eggs were deposited) to a maximum of .372 mm. at a later period.

TABLE II.—MEASUREMENT OF EGGS MADE DURING THE INCUBATION PERIOD, SHOWING TO WHAT EXTENT THEY ENLARGE AS THE SEASON ADVANCES.

	Length		Width		Average	
	Max.	Min.	Max.	Min.	Length	Width
July 31	.129mm.	.064mm.			.098mm.	
August 16	.194	.145			.172	
August 21	.291	.169	.275mm.	.160mm.	.214	.194
September 8	.307	.226	.226	.173	.260	.206
September 16	.372	.178	.340	.162	.263	.224
September 21	.291	.275	.258	.210	.283	.234
September 27	.356	.275	.291	.226	.310	.264

Segmentation of the larva is readily distinguishable through the cellular membrane. At the latter part of the season it was not uncommon to find larvae with the head, thorax, and abdominal segments clearly defined; such larvae are capable of considerable movement, although still completely enveloped within the embryonic membrane. In such instances this membrane was plastic, readily conforming to the movements of the larva within. After the breaking of this membrane the larva appears to float in the body fluids. Much development occurred after the rupture of the membrane. In all mealy bugs examined the parasites were situated in the abdominal cavity with the head toward the caudal extremity of the host. The parasitic larvae are whitish, with a watery appearance. Segmentation is quite distinct, particularly in the later stages. In the dissecting process the larvae were capable of some activity, but only as long as they remained moist in the body fluids.

When the body fluids of the host were almost exhausted, its outer integument became tense as if near the bursting point, and it took on a form resembling somewhat a barrel or a kernel of wheat, the legs and other body appendages losing all form and becoming mere threads attached to it. Thus transformed, the exoskeleton of the host became the hibernating quarters for the parasite within. These winter parasite cases were about 0.413 mm. long and 0.168 mm. wide. Previous to this transformation, the parasitized nymphs usually migrated from the foliage to the limbs (as normal nymphs do), crawled into some crevice or under the scaly bark and produced a small amount of white, waxy covering. A few however were found embedded among the pubescence of the leaves, indicating that the host had been overcome or exhausted before migration.

Just prior to the middle of September the first winter cases were observed. From this date the typical barrel-shaped parasitized host increased rapidly in numbers, but it was not until late in October that the process was finally completed. The parasites pass the winter as mature larvae. In the spring they transform to pupae and the adults emerge, as indicated in the graph.

The importance of *Allotropa utilis* Mues. is its occurrence in the fruit growing area of Nova Scotia, wherever the mealy bug is present. The degree of parasitism seems to fluctuate according to the abundance of the host, varying from 50 to 66 per cent. in those orchards when the host is abundant and from 2 to 15 per cent. where the mealy bug is not numerous.

A FEW NOTES ON CHRYSOMELIDAE

BY JOS. I. BEAULNE
Plant Protection Service, Quebec

The family Chrysomelidae was established by Redtenbacker in 1846, but its principal subdivisions and its definite limits were not fixed until 1848 when that eminent French entomologist, Lacordaire, gave us his "Monographie des Phytophages".

All the chrysomelids are phytophagous; the majority of the species lives at the expense of the tender parts of plants, notably the leaves. Quite a number of these are major pests in agriculture and very nearly all of the injurious

forms belong to two subfamilies, the Galerucinae and Halticinae. Among the species of the last two named subfamilies we note the potato flea beetle, cabbage flea beetle, and the striped cucumber beetle. The Colorado potato beetle is well known as a species of chrysomelid which causes enormous losses to the potato crops in Canada and in the United States. Europe was never acquainted with this last mentioned pest until the great war. It found the means of introducing itself on another continent by stealing a ride as a stowaway aboard troop and supply ships, and today France, Germany, Belgium, and England are beginning to feel its bad behaviour. Before many years it will be solidly established in several sections of the European continent. The asparagus beetle and the elm leaf beetle are also two well known and injurious pests.

The entomological literature, especially that part relating the life history of injurious insects, abounds in reports which relate the damage caused to different crops by these pests.

The larvae of Chrysomelids have the same food habits as the adults and are often far more injurious. Many of the larvae live on the outside of the plants, and though in some cases are of a dull color, other species are brilliant; other larvae live in the interior of plants where they devour the tender parts and not the woody texture, unlike the majority of longicorn larvae.

The eminent French entomologist Chapuis divided the larvae of the Chrysomelidae into the following sections:

Nude Larvae.

A. Rectilinear larvae, nearly cylindrical and of a whitish color, living in aquatic plants and which in order to pass to the pupal stage, construct a cocoon which they fix under water to the rootlets of the host plant (*Donacia, Haemonia*).

B. Mining larvae, more or less elongate, attenuated at both ends; they transform in the interior of plants and in the soil (*Haltica*); others live in the interior of leaves and bear lateral rugosities (Hispidae).

C. Larvae short, oval, very convex, with a colored pattern or of dull color with metallic reflections, generally distinguished by verrucose appendages at the posterior end or by verrucosities on the sides of the body and the faculty of secreting a gluish froth; they live freely on the leaves and suspend themselves by the abdominal apex or enter the soil to pass their metamorphosis. (*Chrysomela* and *Galerucella*).

Larvae covering themselves with their excrement.

Larvae elongate and of a whitish color, curved from the first abdominal segment; they are lodged in portable cases; they live on plants on the exterior of which they undergo their metamorphorsis (*Cryptocephalus*). The tubes made by the larvae of certain species protect their bodies from dessication, and do not, as certain authors have repeated very often, protect them against the attack of their enemies.

There are about 20,000 species of Chrysomelidae in the whole world. Of this number North America has between 800 to 1000 species of which about 350 species are to be found in Canada.

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